

The Maxwellians. Bruce J. Hunt. xiii + 266 pp. Cornell University Press, 1991. \$34.95.

Almost everyone who has a passing interest in the history of the physical sciences has examined James Clerk Maxwell's 1873 *Treatise on Electricity and Magnetism*. Those who expect to gain some insight into the origins of field theory, the displacement current, Maxwell's equations and the electromagnetic theory of light, however, are usually disappointed because Maxwell's *Treatise* is a remarkably opaque document, especially for the reader who thinks of electric forces as the result of the interaction of charged particles. Even to the physicists of Maxwell's time, who were inculcated chiefly in continental theories of electromagnetic phenomena that were particle-based and that focused almost exclusively on events inside conductors, Maxwell's work was notoriously hard going. Given that Maxwell died in 1879, having had little direct contact with students in the preceding years, it is somewhat remarkable that the *Treatise* found an audience, and that it came to be the most influential document in 19th-century electrical theory.

The interpretation, correction and extension of Maxwell's work was achieved by a group of British physicists, the most prominent among them being George Francis FitzGerald, Oliver Lodge, Oliver Heaviside, Joseph Larmor and J. J. Thomson. The peculiar triumvirate of FitzGerald, Lodge and Heaviside (termed by Bruce Hunt "the Maxwellians") forms the focus of this extremely readable and in-

teresting volume. Beginning in the 1870s, these men took as their agenda the comprehension of Maxwell's work; until the turn of the century they explored its consequences and attempted to resolve its contradictions, greatly extending and simplifying Maxwell's original conception, while retaining what they saw to be his fundamental viewpoint.

Bruce Hunt records the process by which they did so, drawing heavily on the correspondence of the three. He presents general descriptions of the various stages in their theoretical itinerary, as well as of the underlying conceptions of Maxwell's work that led them to these views. Included are accounts of their attempts to grapple with the notion of electromagnetic waves, of their complex models of the ether and of the origins of the FitzGerald contraction. In places I found Hunt's discussions particularly illuminating on the relationship between the content of theoretical physics, its practice and its context. In this regard, I would highlight his depiction of the relationship between Heaviside's theory and his knowledge of practical telegraphy, as well as the author's account of the obstacles posed by those within the engineering community to the acceptance of Maxwellian theory.

The entire story is fascinating and often surprising. It deserves a wide audience. This will be facilitated by the fact that the book is in English, not in mathematics; a few equations appear, but most are in plain prose. There is an accompanying disadvantage to this avoidance of technical detail, namely an occasional uncertainty about what exactly is being asserted. Most readers will be grateful, however, for the economy and smoothness of presentation that Hunt's technique affords.

The book presupposes a familiarity with some of the problems posed by Maxwell's original formulation of electromagnetic theory. It could have been rendered more self-contained by a brief account of some of these issues at the outset, although the reader is directed to appropriate recent literature. Hunt's interpretations diverge at times from those found in this literature, in part because he is rather a partisan of his Maxwellians and accepts their own assessment of their role as the true bearers of Maxwell's torch. Yet if his account borders on the affectionate, it is thoroughly scholarly. Capturing the humanity of these rather odd ducks, especially Heaviside, is no mean feat in a work concentrating on their scientific opinions.

The book is attractively designed and well-manufactured. The pedal footnotes were particularly welcome in a work that often makes reference to supporting materials.—Thomas Archibald, *Mathematics, Acadia University, Wolfville, Nova Scotia*